INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	Ingersoll Rand Company	**Date Submitted**	*05/12/2023*
Project Title	Redesign of Material Presentation and Delivery for Assembly Operations **(IR_ASSEMBLY)**	**Planned Starting Semester**	*Fall 2023*

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

Discipline	Number	Discipline	Number
Mechanical	2	Electrical	
Computer		Systems	3

Company and Project Overview:

Ingersoll Rand Company (www.irco.com) is a 160 year old diversified industrial equipment manufacturer, with its global headquarters located in Davidson, NC, USA. Driven by an entrepreneurial spirit and ownership mindset, Ingersoll Rand is committed to helping make life better. We provide innovative and mission-critical industrial, energy, and medical products and services across 40+ respected brands designed to excel in even the most complex and harsh conditions where downtime is especially costly. Our employees connect to customers for life by delivering proven expertise, productivity and efficiency improvements.

This project will take place at our production plant in Mocksville, NC. It will focus on the methods of material presentation and delivery to the assembly lines and stations for centrifugal and rotary air compressors.

The Mocksville plant sits on 117 acres with 425,000 square feet divided amongst various buildings. Approximately 300 employees work out of this facility. The plant first began machining rotary compressor components in 1965. In 2009, centrifugal and rotary compressor assembly

transitioned from Davidson to Mocksville. Turbo Air centrifugal compressors and the Remanufacturing Center were transferred to Mocksville within the past 4 years. Rotary, Plant Air Centrifugal (PAC), air end remanufacturing, and new aired production compose 90% of Mocksville's volume breakdown.

The purpose of this project is to optimize the methods of material presentation and delivery for both rotary and centrifugal compressor assembly. Each compressor is engineered to order as customers require different air flows, pressures, etc. Once a customer makes selections regarding performance and options, Engineering uploads the configuration into the manufacturing system. This results in "Build Books" being generated that have the Bill of Materials, assembly drawings and work instructions. The assembly is done in stages through different work areas in the production area. The parts are picked in the stockroom and sent to multiple drop zones associated with the different work areas. The objective for this project will be to design, develop and test improved ways to deliver and present the parts are each drop zone. Current methods have the risk of loss, poor ergonomics and inefficient builds, so the student designs should improve those results.

This will likely require more than one solution due to the different assembly methods of rotary and centrifugal. Pumps can be heavy, so presentation and handling for heavy parts should be addressed. While rotary airends and packages are assembled like an assembly line, the centrifugal compressors are engineered-to-order and assembled in cells. Optimized material presentation and delivery is crucial to both rotary and centrifugal assembly to reduce wasted time searching for parts and inventory errors.

Here are two examples that show how parts are currently presented to a work location:

INDUSTRIAL SOLUTIONS LABORATORY

Project Requirements:

- Analyze current material presentation and delivery system
- Identify and develop an optimized process for presenting and delivering materials of various shapes, sizes, weights, etc. in a manner that makes it easy for assembly technicians to find the correct parts
- Improve/automate current manual process for exporting BOM from SAP to Oracle
- Develop or procure an improved cart/tub/etc. for delivering materials
- Test prototype design improvement at the Mocksville location.

Expected Deliverables/Results:

- Project plan and schedule
- Bi-weekly progress reports
- Final design/process concept with alternates
- Working prototypes of carts
- Estimated time and cost savings
- Final report
- Display poster for project team

Disposition of Deliverables at the End of the Project:

Students are graded based on their display and presentation of their team's work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter's location, it must be returned to campus for the Expo. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. This handover must be concluded within 7 days of the Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Familiar with/interested in SAP and/or Oracle
- Interest in process improvement, automation, and optimization
- Familiar with/interested in Lean Six Sigma
- Travel to Mocksville, NC will be required.